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ABSTRACT

This paper is concerned with the Aristotelian notion of "universal" as applied to phonological phenomena. It is claimed that speech production in children and adults, in normal and deviant speakers, and in a variety of languages, can all be described according to the same universal phonological rules which constitute the universal process of grammar optimalization, that is, the process of working toward the replication of some standard adult model. For diverse reasons, the linguistically deviant fail to optimalize their grammars. It is concluded that the phonological rules of language acquisition are universal and finite in number, that these same rules are found in deviant language acquisition, that they are also found in adult dissolution of language facility, and that they are the motivation for the diachronic phenomena studied by historical linguists since the time of Rask, Grimm, Bopp, Pott, and Schleicher. (AM)

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FOR THE FIRST ANNUAL BOSTON UNIVERSITY CONFERENCE ON LANGUAGE DEVELOPMENT

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THE UNIVERSALITY OF ACQUISITIONAL PHONOLOGY

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The problem of just what is meant by a "universal" has troubled philosophy for two and a half millennia; its currency in linguistics is briefer -- but not less troubled. Aristotle's position is made clear in the Categories [2^a 11-13]: the universal is that which is common to many bodies. Thus, for Aristotle, unlike Plato, the universal did not exist as a thing, as a primary substance; nor could it exist as do the Platonic Forms (like Truth or Beauty or Horse). For Aristotle -- but not for Plato, or Porphyry, or any of the pagan or Christian neoplatonists.-- universals were a logical, not a metaphysical problem. The theory of universals in philosophy comes down to the question of accounting for similarity in nature by classifying entities in terms of ultimate categories, of asking "What justification do we have for grouping many different things under the same general term?".

In 1968 Paul Kiparsky essayed a definition of linguistic universals as follows:

> The linguistic universals which linguistic theory specifies include fixed notations in which grammars are written and an evaluation

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> measure, which together establish a hypothesis about which of the innumerable grammars that might characterize the sentences of a language possesses psychological reality ... From among the pile of generalizations that might be made they select certain ones as being linguistically significant and corresponding to the generalizations that a child hearing such utterances would actually arrive at in constructing his grammar. [1968:171]

It is the last portion of this which is of importance to us here, and it is quite different from the sort of universal proposed by Koutsoudas, Sanders and Noll [1974] and spiked by Cathey and Demers [1976]. The sort of universals I am concerned with here today are an application of the Aristotelian notion to phonological phenomena: which phonological phenomena are common to many bodies? And in the case presented here, the many bodies stem from "normal" children acquiring a variety of languages, from children with "abnormal" speech, from adults with abnormal productions. And the contention I would like to put forward is that the productions can all be described in a given way, that the same "rules" are applied to the perceived utterances by both children and adults, by normal and deviant speakers, and that these "rules" are universal in the Kiparskian sense

that they are the generalizations applied by a child in constructing the phonological component of his or her grammar.

In several papers, Salus and Salus have attempted to show that the same phonological rules -- at least partially ordered -- apply to the productions of children acquiring English, Estonian, Czech, German, and French. Recent work by Kerek [1975] encourages us to add Hungarian to this list. At the same time, we have attempted to demonstrate that the phonological productions of a group of children diagnosed as developmentally aphasic use the same rules in modifying adult words as do normal children. In brief, that the child diagnosed as developmentally aphasic does in fact have a developmental problem, that his or her phonology is more like that of a substantially younger normal child, and that the productions are different in degree, not in kind. This is confirmed by the work of Ingram and others.

On yet another front, the work of West and Weber and Oller and Kelly with deaf and hard-of-hearing children, lends credence to the notion that they too are using the same set of rules, but that because of the hearing loss the "perceived utterances" are not identical to those perceived by hearing children.

Haas [1963] and Pollack and Rees [1972] mention patients seen in speech and hearing clinics whose productions fit in quite regularly with those mentioned earlier.

A yet more interesting case is the one of "Genie," reported by Fromkin et al. [1974] and Curtiss et al. [1974]. Though many of Genie's productions were highly unstable, that is they were different within a short space of time, they none the less exhibited a number of things predictable from our earlier research. At this point, then, we would assert that the various "rules" in Salus and Salus [1973, 1974] take effect in the developing phonologies of children acquiring a variety of languages (Indo-European and non-Indo-European); and normal children, hard-of-hearing children, developmentally aphasic children, and an extremely deprived child acquiring English.

If we turn to adult pathologies, it is clear that the same phenomena occur in the productions of the adult aphasics reported by Blumstein [1968, 1973], Keller [1975], and Schnitzer [1972]. In the fall of 1974, Mary W. Salus recorded a number of the utterances of a 54-year-old man suffering from cerebral palsy. Not only do these verbalizations illustrate a number of the rules we had set up, but their production certainly reflects a more "juvenile" stage in phonology than the nature of

the lexical items would lead us to expect.

Kiparsky and Menn conclude that "The child is faced with two distinct problems in learning phonology: in the early stages, the quasi-ph[y]siological problem of his own limited phonetic capabilities, to which the adult output must be fitted; later ... the cognitive problem of learning the abstract regularities of the phonological system, whether in order to remember, understand, or speak his language" [45]. We would concern ourselves most with the first of these, and assert that the limitations of the "phonetic capabilities" -- either on an input or an output level -- are the neurophysiological determinants of the phonological outputs of not only normal children, but also defective learners, whether child or adult.

If we look most closely at children's productions, we must conclude that the child continually attempts to optimalize his or her grammar as he or she grows older: that is, in an attempt to come closer and closer to the perceived target (which we assume to be the adult production), the child first orders his or her rules, then adds some, deletes others, limits the domain of yet others, and subsequently reorders the residual inventory. In some respects, this is a continuous process; in other respects, a great many

regular changes seem to come about quite suddenly. Kiparsky and Menn (as well as Stampe [1972], Salus and Salus [1974], Menn [1973], and others) have noted the importance of grammar revision in which the child applies rules universally, as the developing grammar does not provide for exceptions to rules, which are opaque to the child, and which results in the production of "incorrect" forms. Thus, in morphology and in phonology, the restriction of the domain of rules -- and occasionally their elimination -- is a step in the ever-closer approximation of child (and other imperfect) systems to the adult target.

The suggestions that historical phenomena are the result of these same natural processes (Kiparsky [1971], Stampe 1972; Anttila 1972) lend further credence to the notion that optimalization of grammar is the goal towards which all phonological phenomena tend. It is interesting that supression by reordering frequently occurred in Germanic, for example; and that the same rules of consonant cluster simplification seem to apply in the child examples above and in loan words in Swahili and Wes-Kos.

If we accept the notion that the processes are innate and universal (especially in line with the notion that they are rooted in the neuro-

physiplogical capabilities of the speaker/hearer, and further that the goal is the replication of some standard adult model, then we must look for the mechanisms by which the child applies these innate processes to the input to yield the observable output. We must thus line up the observed input, the observed output, and the hypothesized processes or rules in some meaningful way so that the output is the result of the application of the rules to the input. This means that at a very early stage the child must have a very simple phonological grammar. We developping perception and mastery of muscular control, the child gains volitional control of a vast variety of sounds and begins to match this repetoire more closely to the perceived model. This means that the child's phonology becomes more complicated, that it possesses greater varieties of sounds used in a variety of contexts. At the same time, as our representation of the child's productions is in terms of deviations from the model, the number of processes or rules required to derive the child's production from the adult model <u>decreases</u>. What we thus mean by optimalization of the grammar is the attempt at reducing the number of deviations from the model to none. In other words, the optimal grammar produces forms which are nearly identical to adult

productions of those items. Seen in these terms, the young child's phonology has a larger number of "rules" than does that of an older child; and the "defective" or "abnormal" or "deviant" speaker has a more elaborate set of rules than does his or her "normal" counterpart.

For diverse reasons, the childhood aphasic, the severely deprived child, the cerebral palsied, and the aphasic fail to optimalize their grammars. One aspect of this inability to optimalize is the fact that early rules are not discarded or adapted as later ones are acquired; another is the fact that rules are frequently not ordered vis-à-vis one another, so that the same word may have several different forms. The first of these results in the more complex phonological system discussed in Salus and Salus [1973], the second is the cause of instability in production discussed in Oller and Warren [1973] and also noted in the 54-year-old dysarthric.

In conclusion, then, I would like to maintain that the phonological rules of language acquisition are universal and finite in number, that these same rules are found in "deviant" language acquisition, that they are also found in adult dissolution of language facility, and that they are the

motivation for the diachronic phenomena studied by historical linguists since the time of Rask, Grimm, Bopp, Pott, and Schleicher.

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"It is not until we have studied pathological phenomena that we can get an insight into normal ones." S. Freud (SE 7.286)

Some rules:
Cluster simplification; Weak-syllable deletion; Initial voicing; Vowel lengthening; Denasalization; Final devoicing; Assimilation; Delateralization; Spirantization; Depalatalization

Examples:
[geyp] 'escape' Weak-syll. dele. & init. voicing
Fr. [kus] 'Auguste', [apè] aspèrge Weak-syll. dele. & Cluster simplification
Cz. [ponta] sponka 'buckle', [tûl] stul 'table', [tenita] sklenice 'glass' Cluster simpl. & assimilation
Liquid cluster simpl.: Eng. [piyz] please, [aepuw] apple, Fr. [to] trop, [tem] crème, Cz. [peť] plet 'skin' [ti] tri '3' Ger. [wau] Frau; Est. [ápikù] apricot
Nasal simpl.: Eng. [det] tent, [giyk] drink; Ger. [ai] eins '1', [dada] danke 'thanks'
Delateralization: [yuk] 'look'
Spirantization: [zu] 'you'
Depalatalization: [was] 'wash', [tabudz] 'cabbage'

Child aphasic (Wanda):
[hʌdiy] ⟨ [hʌgiŋ]
[bwae?] ⟨ [flaeg]
[bes] ⟨ [best]
[waebiy?] ⟨ [raebit]
[da?] ⟨ [stap]

Bernie:
[p$\overset{w}{u}$wn] 'spoon', [yʌp^{h}] 'lamp', [s$\overset{w}{}$ʌk^{h}] 'truck'
[f$\overset{w}{}$ʌk] 'frog', [baeš] 'bath'

Genie:
[kʌréy] 'crayon', [dátʌ] 'doctor', [sʌtó] 'stove', [prayz] 'surprize', [síbʌ] 'zebra', [gwe] 'square'

Adult aphasic (from Blumstein 1973):
[te] 'day', [buv] 'move', [top] 'soap', [pItI] 'pretty', [trit] 'Crete', [rof bif] 'roast beef'

Adult dysarthric:
[sIpʌ] 'zipper', [maes] 'match', [stiŋ] 'string', [fɔg] 'frog', [fael$\overset{\sim}{ə}$tayn] 'Valentine'

Instabilities:
[giyk], [dig] 'drink'
[fwɔk], [pfɔk^{h}] 'frog'
[p$\tilde{u}$], [səp$\tilde{u}$] 'spoon' (Genie)
[miwsi?], [myuwik] 'music' (Adult dysarthric)

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